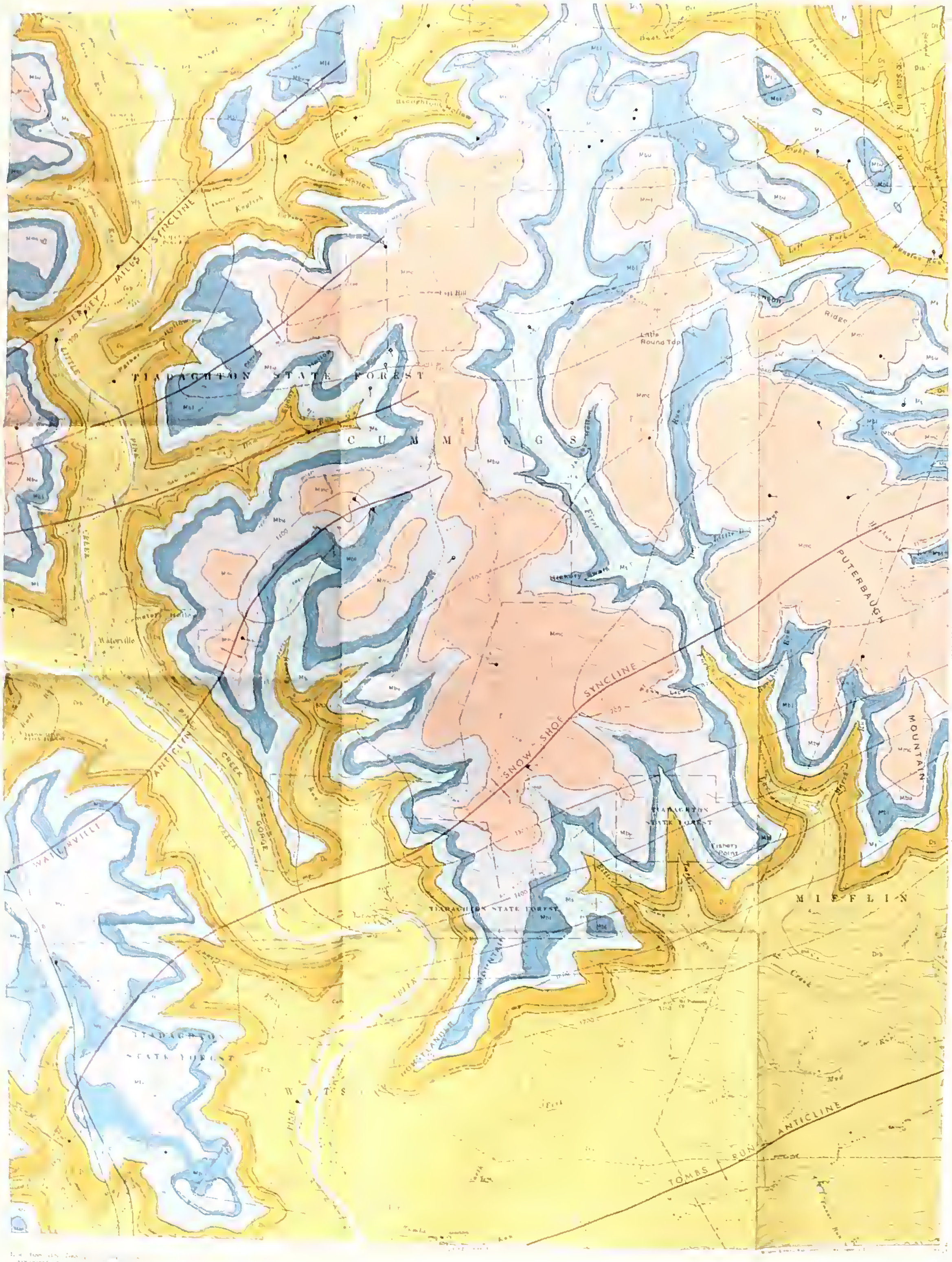
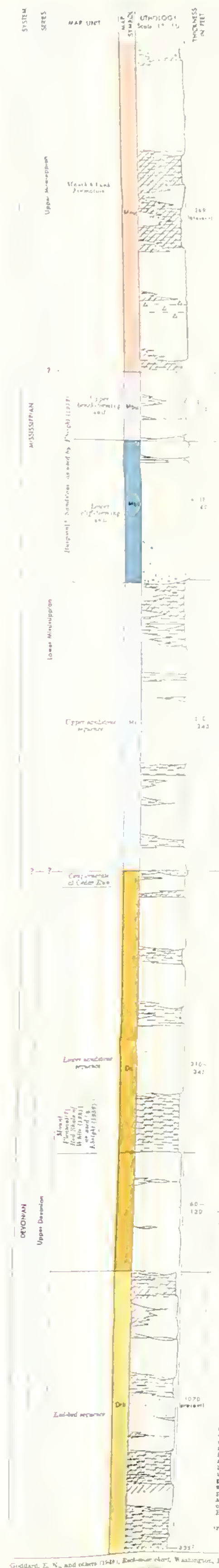


GEOLOGIC MAP OF THE WATERVILLE QUADRANGLE, PENNSYLVANIA

Geology by G. W. Colton, 1951-1954
assisted by T. J. M. Schopf and R. E. Banks,
1961, and Michael Forth, 1963



Bedrock Geology of the Waterville Quadrangle, Lycoming County, Pennsylvania[1]

by

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prepared in cooperation with
The Pennsylvania Geological Survey

This is the third in a series of reports, geologic, stratigraphic and structural on the geology of central Pennsylvania. The work is being done in cooperation with the Pennsylvania Topographic and Geologic Survey. Two quadrangles to the southwest have been published: Cedar Run (Colton, 1965) and State Run (Colton and Luft, 1965). Fieldwork has been completed and compilation is underway on two more quadrangles in the south and southwest: immediately the Jersey Shore and Lock Haven quadrangles.

Prior to the present investigation, the geology of the Waterville quadrangle was shown on a planimetric map locals 1 1.25,000) of Lycoming County, Sherwood and Platt, 1948). The western quadrant of the quadrangle was included in a reconnaissance contour map locals 1 48,000) by Ebright 1952). More recently, the coal-bearing rocks has been shown locals 1 250,000) on the Geologic Map of Pennsylvania Heisy, Sherpes, and others 1961).

Fieldwork in the only commercial product obtained from the bedrock of the Waterville quadrangle. Many quarries (shown on the accompanying map) for flagging are active. Small dimension stone have been operated in the past, but to the writer's knowledge only two, about 0.6 mile south of Ramsey, were active as recently as 1965. All production has been from the inclined and lower diffuse sequences. The rock most available for monumental grade flagging occurs in the upper parts of thick gray sandstone units that are overlain by predominantly red sandstone, siltstone, and

[1] Publication authorized by the Director, U.S. Geological Survey.

mudrock beds. Most of the largest quarries are located stratigraphically a short distance above or below a red bed unit provisionally designated the Mineral Pleasant[?] Red Shale of Wells (1938) as used by Ebright (1952).

No deep wells for oil or gas have been drilled in the quadrangle. The bed with the most producing potential, the "Oriskany sand" of the drillers, may occur 2,700 to 3,000 feet stratigraphically below the outcrop belt at Cedar Run. The position of the latter is shown by structure contour lines on the accompanying geologic map.

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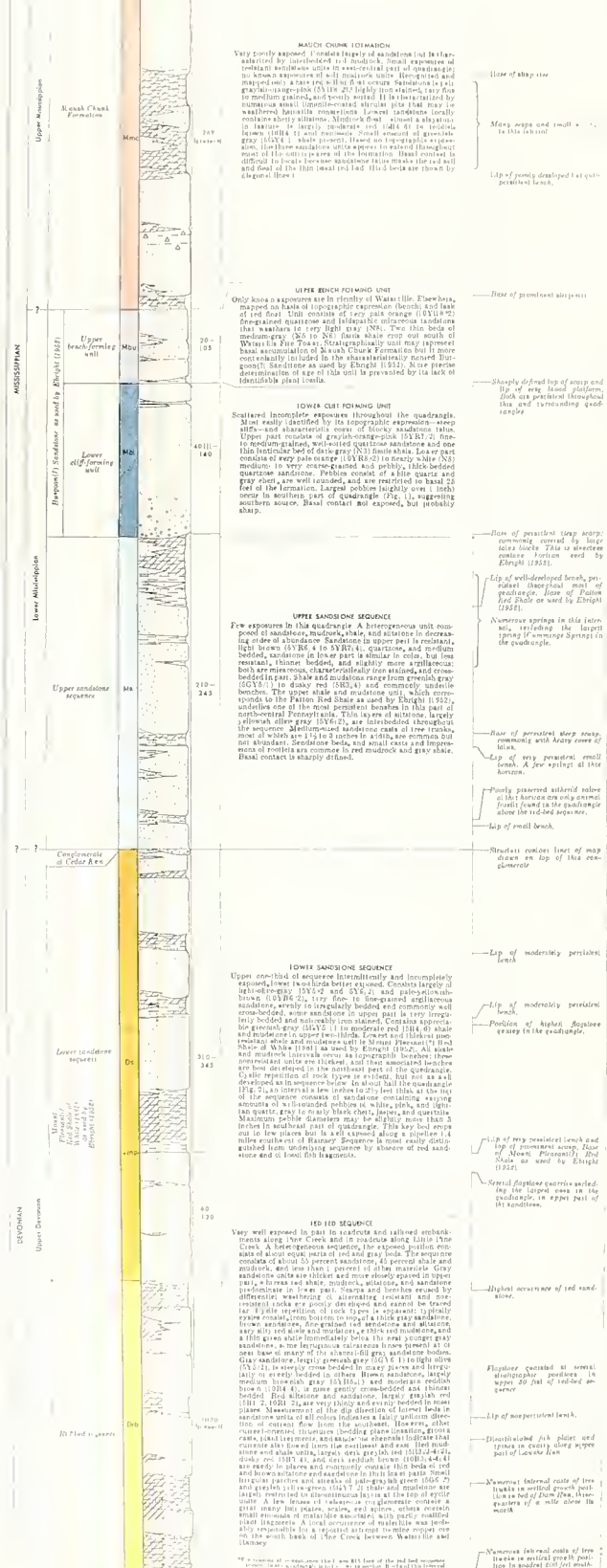
SYSTEM
SERIES
MAP UNIT
LITHOLOGY
Scale 1" = 50'
MAP SYMBOL
THICKNESS IN FEET
DESCRIPTION
REMARKS
MISSISSIPPIAN
Upper Mississippian
Lower Mississippian
DEVONIAN
Upper Devonian
Mauch Chunk Formation
Upper beach-former well
Lower cliff-forming unit
Burgoon(?) Sandstone as used by Ebright (1952)
Upper sandstone sequence
Conglomerate of Cedar Run
Lower sandstone sequence
Mineral Pleasant(?) Red Shale of Wells (1938) as used by Ebright (1952)
Red bed sequence
Mmc
Mbu
Mbl
Ma
Mc
Dc
Dmp
Dcb
249
Interval
20–105
401[1]–140
210–245
?
310–345
60–120
1070
Interval
MAUCH CHUNK FORMATION
Very poorly exposed. Consists largely of sandstone that is lithologically indistinguishable from the Burgoon(?) Sandstone of Ebright (1952). Probably includes some red shale and siltstone.
Base of sharp rise
Many seeps and small springs in this interval
Lip of poorly developed but quite persistent bench.
UPPER BENCH FORMING UNIT
Only a few exposures are in vicinity of Waterville. Elsewhere, mapped on basis of topographic expression (bench) and lack of red float. Unit consists of very pale orange (10YR 8/2) fine-grained quartzose and feldspathic micaceous sandstone that weathers to very light gray (N8). Two thin beds of medium-gray (N5 to N6) flaggy shale crop out south of Waterville. Fine Texas Stratigraphically unit may represent basal sandstone of Mauch Chunk Formation but is more conveniently included in the shales stratigraphically nearest Burgoon(?) Sandstone as used by Ebright (1952). More precise determination of age of this unit is prevented by its lack of identifiable plant fossils.
Base of prominent steep rise
Sharply defined top of steep and flat of very broad platform. Both are persistent throughout this and surrounding quadrangles
LOWER CLIFF FORMING UNIT
Scattered incomplete exposures throughout the quadrangle. Most easily identified by its topographic expression: steep cliffs—and characteristic coarse of blocky sandstone talus. Upper part consists of grayish-orange-pink (5YR 7/2) fine- to medium-grained, well-sorted quartzose sandstone and one thin lenticular bed of dark-gray (N3) fissile shale. Lower part consists of very pale orange (10YR 8/2) to nearly white (N9) medium- to very coarse-grained and pebbly, thick-bedded quartzose sandstone. Pebbles consist of white quartz and gray chert, are well rounded, and are restricted to basal 25 feet of the formation. Largest pebbles (slightly over 1 inch) occur in southern part of quadrangle (Fig. 1), suggesting southern source. Basal contact not exposed, but probably sharp.
Base of persistent steep scarp; commonly covered by large talus blocks. This is uneven contour portion used by Ebright (1952).
Lip of well-developed bench, persistent throughout most of quadrangle. Base of Patton Red Shale as used by Ebright (1952).
Numerous springs in this interval, reflecting the largest spring (Farmingue Springs) in the quadrangle.
UPPER SANDSTONE SEQUENCE
Few exposures in this quadrangle. A heterogeneous unit composed of sandstone, mudrock, shale, and siltstone in decreasing order of abundance. Sandstone in upper part is resistant, light brown (5YR 6/4 to 5YR 6/4), quartzose, and medium bedded; sandstone in lower part is similar in color, but less resistant, thinner bedded, and slightly more argillaceous; both are micaceous, characteristically iron stained, and cross-bedded in part. Shale and mudstone range from greenish gray (5GY 8/1) to dusky red (5R 3/4) and commonly underlie benches. The upper shale and mudstone unit, which corresponds to the Patton Red Shale as used by Ebright (1952), underlies one of the most persistent benches in this part of north-central Pennsylvania. Thin layers of siltstone, largely yellowish olive gray (5Y 6/2), are interbedded throughout the sequence. Medium-sized sandstone casts of tree trunks, most of which are 1 to 3 inches in width, are common but not abundant. Sandstone beds, and small casts and impressions of rootlets are common in red mudrock and gray shale. Basal contact is sharply defined.
Base of persistent steep scarp, commonly with Acuity cover of talus.
Lip of very persistent small bench. A few springs at this horizon.
Poorly preserved asterid colony at this horizon are only animal fossils found in the quadrangle above the red-bed sequence.
Lip of small bench.
Conglomerate of Cedar Run
Structure contour. Interval of map drawn on top of this conglomerate
Lip of moderately persistent bench
Lip of moderately persistent bench
Position of highest flagstone quarry in the quadrangle.
LOWER SANDSTONE SEQUENCE
Upper one-third of sequence intermittently and incompletely exposed, lower two-thirds better exposed. Consists largely of light-olive-gray (5Y 5/2 and 5Y 6/2) and pale-yellowish-brown (10YR 6/2), very fine- to fine-grained argillaceous sandstone, evenly to irregularly bedded and commonly well cross-bedded; some sandstone in upper part is very irregularly bedded and noticeably iron stained. Contains appreciable greenish-gray (5GY 6/1) to moderate red (5R 4/6) shale and mudstone in upper two-thirds. Lowest and thickest persistent shale and mudstone unit is Mount Pleasant(?) Red Shale of White (1938) as used by Ebright (1952). All shale and mudrock intervals occur as topographic benches; three intervals of units are thickest, and their associated benches are best developed in the northeast part of the quadrangle. Cyclic repetition of rock types is evident, but not as well developed as in sequence below. In about half the quadrangle (Fig. 2), an interval a few inches to 25+ feet thick at the top of the sequence consists of sandstone containing varying amounts of well-rounded pebbles of white, pink, and lightgray quartz, gray to dusky black chert, jasper, and quartzite. Maximum pebble diameters may be slightly more than 3 inches in southeast part of quadrangle. This key bed crops out in few places but is well exposed along a pipeline 1.4 miles southeast of Ramsey. Sequence is most easily distinguished from underlying sequence by absence of red sandstone and of fossil fish fragments.
Lip of very persistent bench and top of pronounced scarp. Base of Mount Pleasant(?) Red Shale as used by Ebright (1952).
Scarcity flagstone quarries underlying the largest ones in the quadrangle, in upper part of the sandstone.
Highest occurrence of red sandstone.
Flagstone quarried at several stratigraphic positions in quadrangle, in upper part of red-bed sequence
Lip of less persistent bench.
Discriminated fish plates and spines in scarcity along upper part of cascade run
Numerous internal casts of tree trunks in vertical growth positions in bed of Dam Run. Most quarters of mile above its mouth
Numerous fish-cast casts of tree trunks in vertical growth position in modified 600 feet southeast of east end of dam on Little Pine Creek
Lip of small bench
Lip of small bench
Lip of small bench